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ABSTRACT

The College of Education and Human Service Professions of the University of Minnesota, Duluth, has established a Center for the Advancement of Learning Technologies. The Center is committed to the development of interactive learning technologies which can be used effectively in formal and nonformal continuing adult education. Emphasis has been on the development of interactive videodisc software designed to teach the uses and applications of portable and less-expensive microcomputer equipment and software. Interactive videodisc hardware links the microcomputer and television through electronics and laser technology. This technique will be valuable for the increasing numbers of educators who teach individuals, groups, and organizations how to cope with change. As a result of the world becoming more interdependent in economics, communictions, and aspirations, individuals must adapt to new careers and job skills. Educators have the knowledge and the technology to take a leadership role in developing and implementing lifelong learning programs in both formal and nonformal settings. (JD)

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THE POTENTIAL OF INTERACTIVE LEARNING TECHNOLOGIES IN FORMAL AND NONFORMAL EDUCATION IN RURAL AND URBAN SETTINGS

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THE POTENTIAL OF INTERACTIVE LEARNING TECHNOLOGIES IN FORMAL AND NONFORMAL EDUCATION IN RURAL AND URBAN SETTINGS

Disparities of educational opportunity between and among rural and urban populations have continued to occur, even as computer technologies with promises of learning revolutions have proliferated. For many citizens in the United States and the world, computer assisted instruction is yet out-of-reach, unfriendly, and a hoax as a vehicle for providing the knowledge, skills, and values necessary for pursuit of happiness and well-being in a complex society. The intensity of need among adults and children for education, however, provides the challenge to educators to develop the appropriate software, instructional formats, and means for delivering technologies which can improve both formal and nonformal education.

In Minnesota, as well as in many other parts of the world, there is increasing recognition of the strong need for research and development in the improvement of nonformal education. In the College of Education and Human Service Professions at the University of Minnesota, Duluth, there is concern for the inadequacy of formal schooling to serve the entire range of educational needs of citizens. This interest has been especially intense during the past decade in which a depressed mining industry in Northern Minnesota has resulted in a demand for education and assistance by citizens in communities in which unemployment has persisted at an excess of 70 percent.

The impact of continuing inflation, information technologies, social change, and unemployment have been felt very strongly in Minnesota, which is part of the northern section of the United States which is experiencing

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population decline addressed by John Naisbitt in his study of "megatrends" in the United States (Naisbitt, 1982). The underemployed, handicapped, minorities, and unemployed citizens in this region of the United States are faced with penetrating needs for retraining, reconceptualizing, relocating, and revitalizing themselves. The formal education system--the schools--has not been designed nor funded to respond to this need. The need for a nonformal education response has been a motivation for the College of Education and Human Service Professions--with its personnel preparation programs for educators, psychologists, social workers, and other human service educators--to address needs of education beyond those met by the formal schools alone.

A Context for Nonformal, Nonschool, and Human Service Education

Nonformal education, in the context of this paper, is used to identify any recurring educational experience which does not result in a diploma, degree, or license. In addressing this broad concept of nonformal education which is but haltingly pursued by some educators in nonschool settings, Eugene W. Kelly wrote that this education taking place in different settings "is not organized, either formally or informally, tightly or loosely, into a working system.... What is lacking is a comprehensive system that would provide strong working ties among all educators in all settings throughout our society" (Kelly, 1982).

How can educator preparation institutions prepare graduates and the current professional force of educators and human service personnel for serving both formal and informal education needs? How can emerging

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computer applications in instruction, increasingly more interactive with the learner and with varied modes of technology itself, be developed and made available to citizens for self-help in the workplace, home, and community. And, what has the concept of nonformal education--as used for social development by UNESCO, AID, and the World Bank and described by writers such as Grandstaff, Guldbrandsen, Botkin, Faure, Kelly, and many others--be applied in the 1980s and 1990s to address the increasingly complex and pressing educational needs of citizens in both rural and urban settings? The writers of this paper suggest that a partial answer may be found through university educator refocus of teacher education, embracing the concept of cooperating human service professions and the rapid development of new and interactive learning technologies.

In the United States in 1984 there is uncertainty among some teacher preparation institutions about the extent to which they can embrace broader missions than educating teachers for formal school settings. While the American Association of Colleges for Teacher Education has had a national Human Service Education Task Force, in which the writers of this paper have contributed, the work and position papers of this Task Force in the past three years to further define and support the interdependent objectives and projects of professionals serving education needs in varied formal and nonformal human service settings have not yet been accepted for international distribution by the AACTE Board of Directors. There appears to be uncertainty at the national level, as well as within many institutions, of the capability of an American teacher preparation program--beleaguered by challenges, inflation, and political criticism--to respond

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to the broader nonformal education needs, when it appears that formal schooling needs may not be being well-addressed.

The attention of American educator preparation institutions needs to focus on both formal and nonformal education needs to improve either. The evidence of major cultural change in the United States and in the world clearly indicates that the continuing education needs of adults in both highly technical and developmental community circumstances will continue to produce a demand for education that the past education system cannot meet. A demand for a new approach to education delivery in both formal and nonformal education settings is demanded with public awareness of telecommunications and awareness of the wide disparities in distribution of learning opportunities and wealth.

There is a continuing need for collecting and analyzing results of differing university program content for preparing educators, cross-cultural efforts in delivery of nonformal education, and emerging processes for applying learning technologies to increase formal and nonformal educational opportunities. While the differences in the problems associated with providing Minnesota unemployed citizens with retraining vary widely on many fronts from the problems associated with providing basic literacy and training to adults in Africa, the commonality of the need for both formal and nonformal education in these settings is clear. The formal schooling system with its commitment to pedagogy and not androgogy has not, and is not likely to be, made responsive to the level of need present. When the complexities of making the existing American education system

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effectively responsive to the needs of American Indian citizens, such as in the seven reservation communities of the Chippewa people in Northern Minnesota are considered, it is clear that the need for simultaneous development of educators for nonformal and formal education is important, and the need for exploring the potential positive impacts of new learning technologies is demanded.

This context places the goals of education beyond considering a "fine-tuning" of the existing schooling system to assure equitable educational opportunity across regional, racial, socio-economic, and child-difference categories. The capability of the institution of education to provide service across the age span of citizens in a global, information society requires a major paradigm shift in "teacher preparation."

The College of Education and Human Service Professions in Minnesota has deliberately organized its faculties and resources to address the problem of preparing educators to develop nonformal and formal education programs. The College of 100 faculty members has focused strongly on an interactive human service professions approach to expanding the knowledge base required of current and future educators and on the effective applications of emerging and planned information technologies in learning. Building from the base of nonformal education literature, such as established at Michigan State University in 1974, the faculty uses an interdisciplinary approach to designing instruction programs (Grandstaff, 1974).

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A Center for the Advancement of Learning Technologies

The College of Education and Human Service Professions of the University of Minnesota, Duluth, has established a Center for the Advancement of Learning Technologies which is committed to development of interactive learning technologies which can be used effectively in formal and nonformal education in rural and urban settings. Current emphasis has been on the development of interactive videodisc software designed to teach the uses and applications of portable and less-expensive microcomputer equipment and software. The basic components of the interactive videodisc learning station, its uses, and applications for rural and urban education needs have been conceptualized as the Center has pursued cooperative project development relationships with hardware companies--such as the CPT Corporation, Olivetti, Digital Equipment Corporation, and Control Data. These computer and word processing companies experience incredibly demanding education and retraining needs for employees as technological advancements occur. There has been strong continuing interest of these corporations in working on a continuing and systematic basis with a college of education which is interested in nonschool or nonformal education and instructional design. The Center in the Duluth College has found particularly responsive partners in software and instructional design in the CPT Corporation, Control Data Corporation, and Digital Equipment Corporation.

The experience of the College and Center with corporation projects has encouraged the faculty to strengthen its missions in both formal and nonformal education. Relationships of educators outside the school

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setting has led to active interdisciplinary discussion of curriculum changes for the preparation of educators. In recognizing that over 60 percent of its graduates with teacher licensure serve in nonschool settings, and in response to the continual need for nonformal education, the College has sought to strengthen its structure and programs to prepare graduates for service in either formal or nonformal settings. Continuing assistance and cooperation between the College and the Minnesota Education Computing Consortium (MECC) in Minneapolis has been an important aspect of the development of a network of educators interested in software development. As advancing technologies have made increasingly possible the capability of learning station technologies to interact with the learner, attention of the College and its Center for Advancement of Learning Technologies has focused on interactive videodisc development.

Interactive Videodisc Learning Technology

Interactive videodisc hardware links the microcomputer and television through the miracle of electronics and laser technology. The result is a television screen with human figures that can interact with the viewer. This breakthrough provides a critically needed human means for addressing the impersonal and passive nature of conventional programmed instruction software. Videodisc hardware and production are continuing to decrease in cost. Within this decade this learning technology is likely to be within the reach of many human service professionals seeking a means for widely increasing access to education.

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The interactive videodisc technology has strong potential for being used in informal settings with adults who need continuing access to learning. Interactive videodisc technology is the first "high tech" innovation to have the "high touch" capability to interest educators in becoming seriously involved in computer software development. The potential of this technology depends almost entirely, however, on the initiative that instructional designers take in the development of interactive videodisc software. Software needs to be developed which takes full advantage of the interactive capabilities described in this paper. The capability of the technology will depend on its uses as determined by software yet to be developed. While computer programmers and electrical engineers have produced the hardware with the above capacities, it is the instructional designer who is needed to apply the technology to the human learning needs which can best be addressed.

The Interactive Videodisc Learning System

Interactive videodisc learning systems are currently available from some companies which have explored the uses of video cassette markets (RCA, Panasonic, Sony). Other corporations with microcomputer products and videodisc playing equipment also have equipment which can be linked into an interactive videodisc learning system. The diagram on the following page illustrates the components in a portable learning station for one user. The microcomputer is equipped with digital videodisc control, allowing instantaneous retrieval of any numbered television frame. Current hardware development levels also provide for the microcom-

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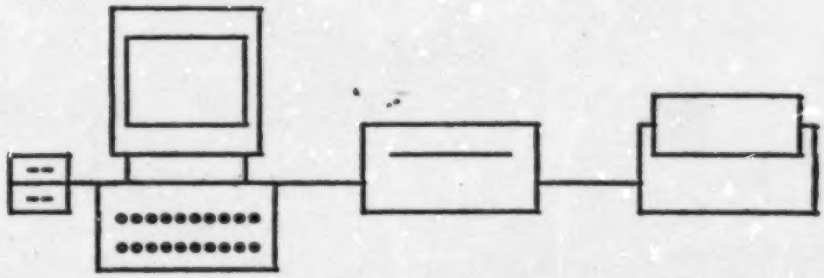
puter to have either a keyboard console (for those who can type) or a touch sensitive monitor screen.

A Diagram of a Videodisc Learning System



Drives Micro Videodisc Player Printer

The printer in this system allows learners to have a record of their accomplishments and assignments to take with them. The learning system is becoming less expensive (approximately $5,000 depending upon unit capabilities), and it is portable. It would be possible to have such a learning station in nearly every school room, counseling office, nursing business, physician's office, public agency, or community center. Within the next few years, it is also probable that this type of learning station may become even less expensive and available in a wide variety of homes in the United States.

Strengths and Weaknesses of Current Learning Technolcgies

For many educators and consumers, however, the past programmed instruction "technologies" have been a sterile and disinteresting arena. The repetitious behavioral reinforcement approach of early programmed instruction materials--so much a basic ingredient in the production

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of most current microsoftware--has yet to attract large numbers of educators, especially those outside the formal school, to become instructional software designers.

The printing press was the first resource for efficiently conveying knowledge and education. A book is a randomly-addressable medium, portable, and inexpensive. Yet, even with pictures and graphics, it lacks sound, motion and interactive human responsive images. Film and videotape brought a solution to these issues; yet, these systems, as well as programmed instruction in books and microcomputers, are narrowly linear in form. A learner must see and hear the lesson in entirety and cannot easily access or delete material which is extraneous. This problem is often associated with live presentations as well. The television presentation or the moving picture cannot be stopped for review; the book has a specified level of reading difficulty; the learner using television or film has no choice of learning route or difficulty of material. The opportunity for the learner or client to interrupt and interact has been commonly lacking in most "instructional" media, and hence of little interest to educators who know the value of the human interaction in learning and change.

Microcomputer software can be branched to provide alternative learning routes; but without the benefit of the realism of television images, most of current microsoftware is linear, frame-to-frame, part-to-part-to-whole, and potentially monotonous. While color and graphics can help, there is nothing like television to make issues come to life.

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And, now the linear problem with television can be solved with videodiscs which are read by a laser that does not have to touch the disc to find a desired frame. The linear difficulty of having to play a section of film or tape has been solved. This invention allows the micro-managed videodisc to become a randomly-addressable technology. Yet, better than a book, the videodisc adds human motion through televized images. The videodisc is managed by the microcomputer to recall information in a non-linear (random) or linear order (sequenced, The result allows the breadth and depth of content to be varied based on the needs of the learner.

The microcomputer can aid the laser-read videodisc to find an individual or group of frames to play instantly. The first frame of text, graphics, or video motion footage can be retrieved in such a rapid order (easily at the 30 frames per second required for motion pictures) that human behavior may be simulated, allowing artificial intelligence to be within the programmer's reach. With laser reading of the data on a disc, the data and filmed action at the start of a disc may be shown with related material at the end of a disc. Because the microcomputer has capability to "keep track" of each frame of information, and because the laser can read data so rapidly, a myriad of instructional responses to a learner can be made.

With continuing development of the technology, declining costs of production, and initiative by more educators, videotapes may be prepared by educators known to learners. As the technology becomes priced within the reach of the many, rather than the few, there will be profound potential for the technology to extend access to learning opportunities.

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Three Levels of Videodisc Interactivity

Programmed instruction materials, with their "frames" of content and questions and answers, provided a kind of interaction with the learner. There was instant feedback on the correctness of learner responses to questions. Microcomputer software has continued to develop in the tradition of linear programmed instruction. This software can provide this first level of interactivity, but with the addition of some motivational reinforcement comments in print form. There are varied levels of interactivity possible with interactive videodisc systems. The third level can be made available with interactive videodiscs. The fourth level is the true artificial intelligence.

Level I: (as above) After learner responds to posed questions, feedback is provided on the accuracy of answers; reinforcement remarks can be provided.

Level II: Learner's responses to a series or set of questions or choices are collected and analyzed; the level of difficulty of subsequent material is then prescribed.

Level III: Varied counselor or teacher responses to patterns of learner choices are branched; the counselor or teacher can respond through the screen to the learner, providing personal and human reinforcement and motivation; explanations, assignments, illustrations can be provided by a person who really seems to understand the learner.

While the interactive videodisc has decided advantages over earlier technologies, it is, of course, no substitute for the genuine concern and skill of real educators. However, the interactive technology provides the

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opportunity for increasing significantly the ability of the counselor to provide additional service.

Videodisc Features

The "records" of movies that are available in TV-stereo departments of major retailers are examples of videodiscs. The videodisc is a 12-inch brass disc on which a variety of types of information can be stored. The form of the storage is not limited; motion pictures and stereo sound are what have been stored on commercial videodiscs. These two, as well as computer animation, slides, diagrams, digitalized audio and binary data can all be stored on one videodisc (Clement, 1981). Once stored, the information from any part of the disc may be rapidly recalled and displayed. The storage of massive quantities of information (54,000 still color television frames) that can be retrieved randomly and nearly instantaneously has exciting potential for education in general and counseling specifically. This technology allows us to have an illustrated and instantly accessible professional library available on an interactive videodisc learning system!

The amount of information that can be stored on one side of a videodisc is enormous. If text alone is stored, any textbook currently available would easily fit on less than one side of a videodisc. If pictures alone are stored, up to 54,000 different images can be recorded on one side. Depending on the specific type of disk, up to one hour of uninterrupted motion picture film would fit on one disc. In addition to the amount of information that can be stored, the resolution possible is

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excellent. The videodisc has the potential to offer resolution six times as dense as videotape available today (Butler, 1981).

Search and Retrieval--Interactive Videodisc

A microcomputer can be programmed to control the retrieval of the stored information based on input from a keyboard, touchpad, or voice trigger. When this sophisticated controller is added, the system has an additional dimension of interactivity--it responds to touch. Technological coupling of the videodisc player, the microcomputer and a standard color television for display creates a potentially powerful educational system. On one disc, a person can be introduced to the subject area through a carefully sequenced combination of text, slides, motion pictures, and sound. At appropriate points, verbal questions from a filmed prompter are used to determine if the information is being grasped; based on the user's response, the controlling program takes the user forward for more information, or branches to another part of the disc that has been designed to further clarify the information.

The most exciting prospect of this process is that the lessons are controlled by the learner. Visual models, explanations of diagrams, appropriate feedback and rapid knowledge of results are all effectively provided in an interactive mode. Interactive videodisc systems may provide direct personal response, speedy response and the potential for seeing learner improvement. All of these lead to greater learner control. This is important because the learner's control of his own learning is addictive; the more gotten, the more desired (Schlieve, 1982).

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Uses for the Interactive Videodisc for Nonformal Education in Rural and Urban Settings

Current educational delivery systems have not and cannot meet the growing needs for nonformal education. To help resolve the crisis of need interactive videodisc learning technology has the potential to create a cost effectively to fill the gap between need and supply. Whether the local need is associated with the need for training a farm worker to operate new sophisticated equipment, or to educate a family in the social values associated with successful shared role behavior, the interactive videodisc technology--with appropriate software--has the potential to extend educational opportunities far beyond the limits of "live" educators to deliver. The potential for the technology to educate literally millions of underserved citizens across the world is exciting. The immediate need is for software to be developed which addresses priority nonformal education content; the more significant problem to be solved is in the identification of a delivery system of this technology which is not exclusive, confronting the potential for any new technologies to be a cruel hoax in providing educational opportunity for the poor and less advantaged.

Because of the capability of the interactive videodisc learning station to be easily powered by batteries, it is a portable resource, conveniently mobile in rural and urban locations. It can be used as easily in the home, the countryside, or the institutional setting. The opportunity for the use of the technology are as diverse, of course, as the oppor-

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tunities for learning. Level three interactivity described earlier allows higher level learning, associated with the synthesis of concepts and values, to be an arena for the technology. Life skills, so important in adult learning priorities, can be learned by individuals and small groups in the privacy and security of safe relationships. Individuals needing basic skills have the potential to acquire them without being subjected to the stigmas associated with learning in formal settings with wide learner age and social class differences. Interpersonally sensitive and private content, such as in psychotherapy and career development, can be effectively considered with the quality individualized instruction possible with this technology.

The Changing World of Work: Impact of Information Technologies

The concepts of work, careers, and job structures in society are strongly influenced by major cultural movements. The structure of work, jobs, and careers during the past three decades that the United States has been in the midst of the shift from an industrial society to an information society. Consideration of the larger social context of change is essential for the educator and trainer providing services. Whether taken in the broad institutional context, or in the formal schooling perspective, however, education in any society has a basic paradoxical nature. It must simultaneously maintain and transmit the knowledge and experience of the past, while anticipating the future to facilitate change. During decades of rapid and penetrating technological and social change, the pressures on the educating professions are intense to maintain quality

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in status quo services while also reorganizing for anticipated changes.

The increasing impact of computer and telecommunications technologies has affected the world of work since 1950. U. S. Bureau of Statistics data indicate that the United States grew beyond its industrial economic character into an information economy as early as 1963. It was then that over 50 percent of the gross national product was reported within the information sector. In the information economy or information society, the production, processing, dissemination, and evaluation of information becomes the primary factor which drives work and societal institutions.

Shirley D. McCune, of the Naisbitt Group which reports megatrends in society, suggested the following differences in education in the industrial society and the information society:

Education Goals	Industrial Society	Information Society
Cognitive Goals	Basic skills	Stronger higher order skills
	Specific Training	Generalizable Skills
	Right to read	Right to excel
	Unicultural	Global Education
	Literacy as survival skill	Many literacies, more than one language
Affective Goals	Large organization skills	Small group skills
	Organization dependent	Independent entrepreneurial
	Single family orientation	Support group orientation
Curriculum Areas	General, diversified	Science and math emphasis
	Print-oriented	Computer literacy and use of computer tools
Job Preparation	Single-career preparation	Multiple-career preparation
	Late skill development	Early skill development
	Distinct vocational education program	Career-vocational education as integral part of educational community experience

(McCune, 1983)

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The emphasis on higher level learning, multiple job and career preparation, and adult continuous learning have particular importance to education programs which have continued to produce more graduates for nonschool/nonformal service than for public school service. There will be an increasing need for educators who are highly skilled in teaching individuals, groups, and organizations how to cope with change and how to find new meaning in the changing world of technological work. Congress offi cially recognized the importance of lifelong learning in the United States when it passed the Lifelong Learning Act in October of 1976. In 1977 the Lifelong Learning Project included the following definition in its recommendations for the implementation of the Act:

> [lifelong learning is] the process by which individuals continue to develop their knowledge, skills, and attitudes over their lifetimes...; all deliberate learning activities are included, whether they occur in the workplace, the home, through formal or nonformal organizations, through traditional and nontraditional methods, or through the self-directed efforts of the individual himself or herself (Education Division, 1978).

From an analysis of numerous research projects on learning efforts of adults in the 1970s and 1980s in several nations, Allen Tough concluded that "90 percent of all adults studied conduct at least one major learning effort each year. The average person conducts five distinct learning projects in one year--that is, in five distinct areas of knowledge, skill, or personal change" (Tough, 1981). The proliferation of information through technologies requires the person to continue to learn. Considering the broad social context in which learning must occur for effectiveness in work educators and service providers have an important perspective on learner needs, the educational services which should be provided, and the learning

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technologies that are most appropriate to formal and nonformal education settings.

Careers, Jobs, and Paradigm Shifts

The information society legitimizes service provision as a work product; this was not so much the case in the industrial society which focused on mass production of products. As workers have begun to internalize the validity of their being rewarded for providing a service, rather than for producing goods, a change in their value structure about the meaning of work and a career is occurring. When the evidence for change becomes overwhelming, a paradigm shift occurs in society. In his work on scientific revolutions, Thomas Kuhn used the word "paradigm" to describe the model of reality that is internalized when people become socialized as members of scientific communities (Kuhn, 1962). Paradigms remain dominant within social systems because reward structures encourage conformity to established norms.

The Agricultural Revolution and the Industrial Revolution were each defined by major shifts in the existing social paradigm. The components of the dominant social paradigm in most hunting and gathering societies did not have much in common with the dominant paradigm that evolved along with the Agricultural Revolution. And the dominant social paradigm of industrial societies shares little with the dominant paradigm of agrarian ones. The pending Third Great Revolution in human history will, according to Pirages, "fosters a predominant view of the world that is as different from the present dominant social paradigm as the

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industrial one was from its agrarian predecessor" (Pirages, 1978).

Dominant social paradigms are normally passed from generation to generation through socialization and education processes. But, during times of upheaval, the "perceived" nature of physical and social worlds and the values guiding human behavior may be completely transformed in a very short time (Pirages, 1978).

The Nation, and the education system, are currently caught between two conflicting social paradigms of the nation. The past dominant social paradigm has been characterized by Pirages as integrating the purposes of the nation on asserting the nation's industrial and military supremacy. This paradigm of national preeminence requires social institutions, such as education, to seek and develop human resource persons who have the exceptional knowledge and skills to maintain the nation in a position of competitive dominance. The competing and emerging view of the United States is focused on the nation in an interdependent world systems paradigm (Pirages, 1978).

Both the preeminence and interdependence paradigms have penetrating agendas for the social institutions and the subparadigms that influence them. There are strong implications for the world of work and the counselors, educators, and trainers that will need to continue to serve the needs of workers. The interdependence paradigm is closely aligned with observations of the emerging characteristics of the information society. Educators have--in their skills in helping individuals, groups, and organizations--the capability to assist in the paradigm transition.

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The continuing struggle of the national preeminence paradigm to be dominant has strongly and directly contributed to current criticisms of education and schools. This paradigm calls for a return to goals of academic excellence in the production of scientists and technologists who can help the nation regain its position of world supremacy through industrialization. The impact of these goals on educators is much like that felt in the post-Sputnik years of competition with the Soviet Union.

Advocates of this kind of change see direct linkages between the nation's economic and political preeminence and the productivity of the education system. There is more emphasis on formal (schooling) than nonformal education. For example, the need for early identification and rapid development of the most gifted students in math and science is critical to the production of individuals who may invent means for renewing national capabilities in technology and industry.

In contrast, the interdependent world view requires a broadening of formal and nonformal curricula to include knowledge and skills for understanding the nature of interdependent social and physical worlds. The latter approach requires a major revision in the capability of the education system to educate adults, as well as children, to function as citizens of an increasingly global society.

Work and Careers in a Global Information Society

To a greater or lesser extent, a number of scholars see this decade as one in which the territorial state is being eclipsed by non-

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territorial actors such as multinational corporations, transnational social movements, and international organizations. Henry Kissinger, has continued to maintain that "the traditional agenda of international affairs--the balance among major powers, the security of nations--no longer defines our perils or our possibilities.... The world has become interdependent in economics, in communications, in human aspirations" (Kissinger, 1975).

Pirages has analyzed the international political context of change. He wrote that the next fifty years are likely to be the most revolutionary in the history of relations among nations. Not only in the United States, but in the world, the last three centuries of rapid economic growth and expansion in industrialized countries are expected to come to a close. Population explosion, alone, will create a social revolution. In the year 8000 B.C., there were only about 5 million people on the earth. For the next ten thousand years, population increased slowly, with about 500 million by 1650 A.D. (Pirages, 1977).

World population doubled about seven times during this entire ten-thousand-year period. Then, enormous population growth was triggered, doubling the population in two hundred years by 1850. The population doubled again in just eighty years between 1850 and 1930. At present, four billion people live in the world, and the number will double again in less than forty years. By the year 2000, there will be more than six billion people in the world. This explosion of population, and the resulting consumption of natural resources, is unparalleled in human

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history (Ehrlich, 1977). A major consequence of the information society is that news and ideas are instantaneously communicated through mass media and computer resources to almost all parts of the world. The conception of the "community" or "society" in which people live is made more abstract; boundaries of nations, peer groups, and work groups are blurred and reassessed. The flood of information made available creates confusion and a need for people to reconceptualize the nature of their work and social relationships. The result is an increased need for people to have the formal and informal opportunities to reconceptualize ideas and attitudes. The need for more education increases the importance of the knowledge and the skills of educators and other human service professionals.

The rapid growth of computer and telecommunications technologies has created an information society in which the provision of services is the primary focus of work and a majority of careers. According to Arthur W. Chickering, "today the center of the work force is the 'service worker' and the 'knowledge worker'" (Chickering, 1984). Eli Ginsberg described the growth of the service sector in employment as follows:

> Almost the entire growth in post-World War II employment has been in the service sector. Among the goods-producing industries, only construction shows any sizable increase. Agriculture declined by more than half, from some 7.6 to 3.5 million, mining declined by approximately one third, from 995,000 to 572,000, manufacturing--the backbone of the economy--showed only a small absolute increase: approximately a third, from 15.6 to 20 million, which meant that its share of total employment dropped from about 27 percent to 21 percent... (Ginsberg, 1976).

The effects of the emergence of the information society have created

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dramatic shifts in employment patterns. Marvin J. Cetron predicts that job market shifts won't necessarily mean major changes in the numbers of people employed; old jobs will disappear--and not only because of robots and computers. Cetron made the following speculation:

> Manufacturing will provide only 11 percent of the jobs in the year 2000, down from 28 percent in 1980. Jobs related to agriculture will drop from 4 percent to 3 percent. The turn of the century will find the remaining 86 percent of the work force in the service sector, up from 68 percent in 1980. Of the service sector jobs, half will relate to information collection, management, and dissemination.... Unemployment will be an ongoing problem. If the current recession were to end tomorrow, probably 1.2 million of the more than 11 million unemployed in the United States today would never be able to return to their old jobs in the automobile, steel, textile, rubber, or railroad industries. This loss of jobs is called structural unemployment (Cetron, 1983).

The effect of increasing technologies has been felt world-wide. Foreign competition from low-wage countries will, according to Cetron, eliminate about one-sixth of the 1.2 million jobs described above; one sixth will disappear because of the nationalization of many major industries in other countries which will result in distributing products on U. S. markets and undercutting American prices. Cetron predicted that "'computamation' (robotics, numerically-controlled equipment, CAD/CAM [computer-aided design and computer-aided manufacturing], will assist in the demise of the remaining two-thirds of the jobs eliminated" (Cetron, 1983).

The increased uses of computers in industry has increased productivity, quality control, and reduction of waste. Japan, which has to import over 90 percent of its energy, was forced to go to robotics in

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industry to compete with the United States and to address the major work force problem that it has.

> Between 1985 and 1990, 20 percent of the entire work force will retire at 80 percent of their base pay for the rest of their lives. Japan was forced to go robotic to remain competitive. The United States, too, will be filling many of today's blue-collar jobs with robots. The displaced workers will have to learn the new skills to build and maintain the robots (Cetron, 1983).

White-collar workers will experience radical changes in their work, as well, through the applications of such information technologies as word-processing, speech synthesizers, and interactive videodiscs. The capability for the human being to interact with machines with artificial intelligence is now in the present, not the idealized future. Languages can be conveniently translated by word lexicons, and major portions of education and training can be effectively assisted by machines which have the capability to interact and to structure learning opportunities.

As the service industries and information processing fields of the United States continue to develop, it is clear that markets for these services will have to be developed both inside and outside the Nation. The developing nations which are industrializing will be likely markets for U. S. service and knowledge. The need for personnel who can communicate readily and effectively across national boundaries will increase. The need for education, language, data-processing, and human differences knowledge and skills will be higher priority than in the current paradigm of education.

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Educators with the Skills to Respond to Change

Educators, with background well-established in significant areas such as learning, human development, instructional design, curriculum development, counseling skills, value development, higher level thinking, group dynamics, and organizational behavior, have the foundation of knowledge to assume a strong leadership role in the further development of education and the social systems in the information society.

The need for the educator to continue to learn, however, is equally apparent. The educator needs to learn how to more fully understand the full spectrum of nonformal and formal education needs in society, as well as to manage technological learning resources education delivery systems.

Many American educators have a modest knowledge of global issues, such as the interdependence of economic, political, and social factors. As world markets for human service knowledge, learning technologies, and professional personnel increase, American educators could be interacting with more and more people who have differing languages, customs, and mores. Respect for these diversities, as well as communication in others' languages will be more important for human services professionals. Educators will need to continue to consider more fully the importance of their own lifelong learning as well as for other adults living in the transitional world.

The pressure to continue to learn, to synthesize widely divergent

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ideas and values, and to understand the management of learning technologies makes the future work of educators challenging. The importance of the varied educator roles in serving the education needs of adults and children in both formal and nonformal settings places education appropriately in the position of primary importance among the professions. The significance of the missions of education in both formal and nonformal settings challengas educators to cooperate across professional lines in the search for the most effective technologies which can be made available to truly equalize learning opportunities and to provide all citizens with the knowledge and skills necessary for sharing in the wealth of the world.

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REFERENCES

Botkin, J. W., Elmandjra, M. and Malitz, M., No Limits to Learning. New York: Pergamon Press, 1979.

Butler, David W., Five caveats for videodiscs in training. Instructional Innovator, 1981, 26, 16-18.

Cetron, M. J. "Getting ready for the jobs of the future," The Futurist, 27, 3, 1983, 15-22.

Cetron, M. J. & T. O'Toole. "Careers with a future: where the jobs will be in the 1990's," The Futurist, 16, 3, 1982, 11-19.

Chickering, Arthur W., and Associates. The Modern American College. San Francisco: Jossey-Bass Publishers, 1981.

Chickering, Arthur W., "Integrating liberal education, preparation for work and human development: implications for teacher education," unpublished paper presented at the national conference of the American Association of Colleges for Teacher Education, San Antonio, February, 1984.

Clement, Frank. Oh dad, poor dad, mom's bought the wrong videodisc and I'm feeling so sad. Instructional Innovator. 1981, 26, 12-15.

Education Division, Department of Health, Education, and Welfare. Lifelong Learning and Public Policy. Washington, D. C.: U. S. Government Printing Office, 1978. (Stock No. 017-080-01847-1.)

Ehrlich, Paul., and Anne Ehrlich. Ecoscience. San Francisco: W. H. Freeman, 1977.

Faure, E. etal, Learning to Be. Paris: UNESCO, 1972.

Ginsberg, E. "The pluralistic economy of the U. S.," Scientific American, 235, 6, 1976, 25-29.

Grandstaff, Marvin. "Historical Perspectives on Non-Formal Education," Study Team Reports, Program of Studies in Non-Formal Education, Institute for International Studies in Educaton, College of Education, Michigan State University, East Lansing, Michigan, 1974.

Gulbrandson, Francis A., "Paulo Friere and the problem of consciousness," Program of Studies in Non-Formal Education, Study Team Reports. Michigan State University, East Lansing, 1974, 170-175.

Kelly, E. W., Beyond Schooling: Education in a Broader Context. Bloomington, Indiana: Phi Delta Kapa Educational Foundation, 1982.

BEST COPY AVAILABLE

Keohane, Robert O., and Joseph S. Nye. Power and Interdependence: World Politics in Transition. Boston: Little, Brown and Company, 1977.

Kissinger, Henry A. "A new national partnership," A speech by Secretary of State at Los Angeles, January 24, 1975. News release, Department of State, Bureau of Public Affairs, Office of Media Services.

Kuhn, Thomas. The Structure of Scientific Revolutions. Chicago: University of Chicago Press, 1962.

McCune, Shirley D. "Restructuring education: the role of teacher education in preparing students for the 21st century," Speech (materials not for distribution) for the Summer Leadership Institute, American Association of Colleges for Teacher Education, July, 1983.

Naisbitt, John. Megatrends: Ten New Directions Transforming Our Lives. New York: Warner Books, 1982.

Oye, Kenneth A., Robert J. Lieber, and Donald Rothchild. Eagle Defiant: United States Foreign Policy in the 1980s. Boston: Little, Brown and Company, 1983.

Pirages, Dennis. The New Context for International Relations: Global Ecopolitics. North Scituate, Massachusetts: Duxbury Press, a Division of Wadsworth Publishing Company, Inc., 1978.

Schlieve, Paul L. & Young, Jon I. How to produce interactive learning programs. Instructional Innovator, 1983, 28, 28-31.

Toffler, A. The Third Wave New York: Bantam Books, 1981.

Tough, Allen, "Chapter 13: Interests of adult learners," The Modern American College. San Francisco: Jossey-Bass Publishers, 1981.

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